

REMARKS

Claims 1-19 are pending the above-identified application.

In the Final Office Action of March 13, 2003, claims 1, 2, 4-9, 12 and 13 were allowed. The drawings, the specification and claims 5 and 19 were objected to. Claims 3, 10, 11 and 14-19 were rejected.

In response, the drawings, the specification and claims 1, 3, 5, 14 and 19 have been amended. Claim 19 has been cancelled.

A. Objection to the Drawings and Specification Informalities:

The Examiner objected to the drawings because 1) the figures did not include 11f., a reference sign, in the description; and 2) Figures 6-8 should be designated as "Prior Art". In response to this objection, Applicant is submitting herewith a "Request For Approval Of Drawing Changes." In particular, the paragraph on page 30, line 2 has been replaced to include a description of 11f. and Figure 6-8 have been designated as "Prior Art". The Examiner also objected to the specification because on page 26, second paragraph, Figure 1A is reference and yet Figure 1A does not exist in the instant application. In response, Figure 1A of the drawings has been changed to Figure 1. Accordingly, Applicant respectfully requests withdrawal of these objections.

B. Objection to Claim Informalities:

Claims 5 and 19 were objected to. In response, claim 5 has been amended to recite "is welded" instead of "welded" and claim 19 has been cancelled. Applicant respectfully request withdrawal of this objection.

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C. § 112, first paragraph Rejection:

Claims 3, 10 and 11 were rejected under 35 U.S.C. § 112, first paragraph, because the specification allegedly did not reasonably enable person skilled in the art to which it pertains. In response to this objection, the specification has been amended to clarify claims 3, 10 and 11, according to the Examiner's recommendation at page 6, lines 17-23 and page 16, lines 7-10. It is believed that no new matter has been included by this amendment. Applicant respectfully request withdrawal of this objection.

D. § 103(a) Rejections:

Claims 3, 10 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 2000-21380 in view of JP 10-284035. Claims 14-19 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Taki et al (U.S. Patent NO. 5,418,082) in view of JP 10-284035. Applicant respectfully traverses these rejections.

Claim 3 has been amended to recite a non-aqueous electrolyte secondary battery wherein a safety valve comprises a disk that has a plurality of peripheral holes located along a circle centering on a symmetrical point of the central hole. Claim 14 has been amended to recite a safety valve that includes a plurality of the peripheral holes formed on the outer periphery of the disk and the linear thin portion is formed almost along a circle centering on the central hole.

In contrast, JP 2000-21380 ("JP'380") discloses a rupture board for an electrolyte-solution built-in lithium secondary battery; Taki et al. discloses a seal battery with a safety valve that is made of metal plate and spiral laminate and JP 10-284035 ("JP'035") discloses a safety valve comprising a thin portion welded to a lower disk. However, none of the references discloses a safety valve comprising of a plurality of peripheral holes along the center hole symmetrically.

The present invention relates to a secondary battery where a non-aqueous electrolyte solution is injected into the outer packaging. The electrode is stored at the end of the outer packaging can. The free end of the electrodes are sealed by means of a safety valve caulked on one end of the outer packaging through a gasket. At the center of the safety valve, there is a projecting portion that is welded into the electrode lead of the electrodes. The safety valve also has a disk in the center and a sub-disk. When the projecting portion and the sub-disk are separated from each other, a current cut-off operation can be reliably performed. When the pressure in the outer packaging can is higher than the pressure in the current cut-off state, the safety valve itself is cleaved so that the generated gas is released through a ventilation hole formed in the lid of the disk.

In conventional non-aqueous battery, such as the one in JP'035, although a portion of the safety valve is cleaved, the centering portions are only half cleaved and the widths of the cleavage are small. Figure (b) of JP'035 consists of a letter "C" configuration which does not allow the centering portion of the safety valve to be cleaved. In other words, simply having a circular portion, as in JP'035, will not allow for the cleave operation to perform smoothly. This causes the passage area for the generated gas to be only an area corresponding to the difference between the different portions along the safety valve. Thus, when a gas is generated in the outer packaging can, the conventionally used safety valve cannot release the generated gas within a short time and the current cut-off state cannot be performed reliably.

By using a plurality of peripheral holes located along a circle centering on a symmetrical point of the central hole, the cleave operation can be performed smoothly. The passage area allowing for generating gas to pass in the present invention is much larger than the conventional used safety valve. Thus, when gas is generated in the outer packaging can, it can be released

much faster. As a result, a current cut-off operation can be reliably performed in a current cut-off state and gas can be discharged within a shorter time in a cleavage state.

None of the references discloses or suggests a safety valve having two different dimension circles which a plurality of linear thin portions are formed to allow a current cut-off operation to be performed reliably in a current cut-off state, and a gas can be discharged within a short period of time in a cleavage state.

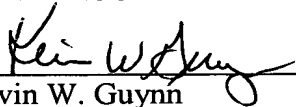
Accordingly, it would not have been obvious to one skilled in the art at the time when the invention was made to combine the references as suggested by the Examiner to derive what is recited in claims 3, 10 and 11 or claims 14-18.

Claims 10-11 and 15-18 depend directly or indirectly from claims 3 and 14 and are therefore allowable for at least the same reasons that claims 3 and 14 are allowable. Applicant respectfully submits that these rejections have been overcome and request that they be withdrawn.

In view of the foregoing, it is submitted that pending claims are patentable over the reference cited by the Examiner. Further, all of the Examiner's objections and rejections have been addressed herein. It is, therefore, submitted that the application is in condition for allowance. Notice to that effect is respectfully requested.

Respectfully submitted,

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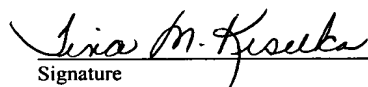
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